Gas Leak on Converter 2nd Pass Outlet

$P/P_A = 1.356$ less than 1.893 $[(k+1)/2]^{k/(k-1)}$ therefore the flow is non-choked (i.e. subsonic), AND the following equation applies

$$Q = CAP\sqrt{(2g_c/ZRT)(K/K-1)[(P_A/P)^{2/K} - (P_A/P)^{(K+1)/K}]}$$

				psia	psig	in WC
Q = mass gas flow (lbs/s)			K = C_p/C_v of the gas	1.4		
C = discharge coefficient	0.65		P = source pressure absolute (lb/ft^2)	2871	19.9	5.2	145
Equivalent Diameter of hole (in)	0.77		P_A = ambient pressure absolute (lb/ft^2)	2117	14.7		
A = area of hole (ft^2)	0.00323		M = molecualr weight of gas	34			
g_c = gravitational constant (ft/s)	32.17		Z = compressibility factor	1.077063			
R = gas constant (ft-lb/lb mol - °R)	1543.3		Release duration (seconds)	35,496			
T = temperature (°R)	1410	510 °C	SO_3 concentration in gas (wt%)	**22.4**			
Molecular weight of SO_3	80		SO_2 concentration in gas (wt%)	**2.0**			
			Molecular weight of SO_2	64			

Intermediate Calculations:

0.000934
3.5
0.647034
0.593079
6.031606

Mass Calculations:

Q =	0.0801 lbs/s
Total mass:	2843 lbs
Total SO_3 mass:	318 lbs
Total SO_2 mass:	28 lbs

Note: SO3 immediately reacts with H2o to for acid mist; RQ for acid mist = 1,000 lbs

Reference: "Perry's Chemical Engineering Handbook, 6th Edition, McGraw-Hill 1984"

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EXHIBIT # 1
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